Attachment A Large Woody Debris Data Summary Forms

Date:	10/8/20	15		Enbridge Representative(s): BP, BD, IJ			
Target A	Area:	17		Agency Rep	resentative(s):	MD, BG SJ, JR	
Mile Pos	st Range:	35.12-36.30					
<u>Existing</u>	Large Woo	dy Debris Obse	rvations				
General	Number of L	WD Observed:	10	9			
LWD Ty	pe (tree, log,	stump complex	pile)(%):	CP-52%, Lo	g-17%, Tree- 2	4%, Stump 7%	
Position	Orientation	(parallel, perper	ndicular, diagonal t	o flow)(%):		Para-48%	
Diagnoa	al- 14%, Perp	38%					
Habitat/	Habitat/Structure Function: All provides fish and amphibian/reptile habitat,						
Notes: most do not have pools, one providing bank protection, none marked as							
	causing bar	nk erosion					
River Cl	haracterisiti	<u>cs</u>					
Channel	l Width:	251 ft			Pool Depths:	3.5'-5'	
Bed Material Composition: Sand/Fine Gravels Riffle Depths: 2'-2.5'			2'-2.5'				
Rosgen (BEHI) Bank Stability: See Note 1 Flow Velocity: 1.2 fps			1.2 fps				
Notes:	. ,	· –		_	•	•	
				_			
Propos	ed Design Co	oncepts					
	of LWD:	 _			Number of LW	'D:	
		ucture Function	(s):				
- 1	, , , , , , , , , , , , , , , , , , , ,	<u> </u>	(-7				
See not	es on target a	area survey field	l maps.				
Other I	tems/Notes	:					
	•	_	vied on annotated	field maps, wi	ith		
			v to Moderate B: B				
	High to Very						
		_	gravels with sand,	imbricated rig	rid bottom		
			g. z. z.o m.c cana)				

Date: 10/9/2015		Enbridge Representative(s): BP, BD, IJ			
Target Area:	16	Agency Rep	presentative(s):	MD, BG SJ, JR	
Mile Post Range: 34.25-3	34.75				
Existing Large Woody Debris	Observations				
General Number of LWD Obser	ved:	64			
LWD Type (tree, log, stump cor	nplex pile)(%):	CP-53%, L	og- 20%, Tree- 2	20%, Stump 7%	
Position Orientation (parallel, p	oerpendicular, diagon	al to flow)(%):		Para-48%	
Diagonal- 19%, Perp39%					
Habitat/Structure Function:	All provides fish	and amphibian	/reptile habitat	;,	
Notes: most do not have pools, none providing bank protection, none marked as					
causing bank erosion					
River Characterisitics					
Channel Width: 160 ft			Pool Depths:	4'-5' (Pool/Run)	
Bed Material Composition:	Cobble/Gravel		Riffle Depths:		
Rosgen (BEHI) Bank Stability: Se			Flow Velocity:		
Notes:			,		
Proposed Design Concepts					
Type(s) of LWD:			Number of LW	/D·	
Proposed Habitat/Structure Fu	nction (s):		riamber of Err	<u>. </u>	
Troposed Hasitaty Stracture Fa	(3)				
See notes on target area surve	v field mans				
See notes on target area surve	y neia maps.				
Other Items/Notes:					
Generalized erosion mappin	a provind on annotat	ad field mans v	vith		
Erosion Rated as follows: A: BE					
	III LOW to Moderate i	B. BEITI MOUELA	te to riigii,		
C: BEHI High to Very High 2. General observations: narrow	A runc				
2. General Observations: Harrov	w runs				
	_				

Date: 10/9/2015		Enbridge Representative(s): BP, BD, I	J	
Target Area:	15	Agency Representative(s): MD, BG	SJ, JR	
Mile Post Range:	33.10-34.00	- 1		
_				
Existing Large Woody	Debris Observations			
General Number of LW	D Observed:	78		
LWD Type (tree, log, st	ump complex pile)(%):	CP-42%, Log-22%, Tree- 21%, Stum	ı p 15 %	
Position Orientation (pa	arallel, perpendicular, dia	agonal to flow)(%): Para-36%	6	
Diagnoal- 7%, Perp57	%			
Habitat/Structure Func	tion: All provides	fish and amphibian/reptile habitat,		
Notes: most do not l	nave pools, none providi	ng bank protection, none marked as		
causing bank	erosion			
River Characterisitics				
Channel Width:	228 ft	Pool Depths: <u>5'-8'</u>		
Bed Material Composit	ion: Sand	Riffle Depths: No disce	rnable riffl	
Rosgen (BEHI) Bank Sta	bility: See Note 1	Flow Velocity: 1 fps		
Notes:				
Proposed Design Con	<u>cepts</u>			
Type(s) of LWD:		Number of LWD:		
Proposed Habitat/Struc	cture Function (s):			
See notes on target are	ea survey field maps.			
Other Items/Notes:				
1. Generalized erosion	mapping provied on ann	otated field maps, with		
Erosion Rated as follow	s: A: BEHI Low to Moder	ate B: BEHI Moderate to High,		
C: BEHI High to Very High	gh			
2. General observations	s: mostly overly wide thro	oughout reach, predominately stable		

Date: 10/8/20	15	Enbridge Representative(s): BP, BD, IJ			
Target Area:	12	Agency Re	presentative(s):	MD, BG SJ, JR	
Mile Post Range:	29.70-30.50				
Existing Large Woo	dy Debris Observations				
General Number of L	WD Observed:	58			
LWD Type (tree, log,	stump complex pile)(%): _	CP-47%, L	og-21%, Tree- 2	1%, Stump 12%	
Position Orientation	(parallel, perpendicular, di	agonal to flow)(%):	1	Para-36%	
Diagnoal- 7%, Perp	57%				
Habitat/Structure Fu	nction: All provides	fish and amphibian	/reptile habitat		
Notes: most do no	t have pools, none provid	ing bank protection,	, none marked a	as	
causing bar	nk erosion				
River Characterisitie	<u>cs</u>				
Channel Width:	148 ft		Pool Depths:	5'-8'	
Bed Material Compos	sition: Cobble/Grav	vel	Riffle Depths:	No discernable riff	
Rosgen (BEHI) Bank S	Stability: See Note 1		Flow Velocity:	1 fps	
Notes:					
Proposed Design Co	oncepts				
Type(s) of LWD:			Number of LW	'D:	
Proposed Habitat/Str	ructure Function (s):				
		_			
See notes on target a	area survey field maps.				
J					
Other Items/Notes:					
	- on mapping provied on anı	notated field maps. v	vith		
	ows: A: BEHI Low to Mode				
C: BEHI High to Very					
== == == == == == == = = = = = = = = =					

Date:	Date: 10/8/2015 Enbridge Representative(s): BP, BD, IJ				BP, BD, IJ	
Target A	Area:	10		Agency Re	presentative(s):	MD, BG SJ, JR
Mile Po	st Range:	25.625-27.6	25			
Existing	g Large Wood	<u>dy Debris Obs</u>	<u>ervations</u>			
		WD Observed:		220		
•		stump complex			og-20%, Tree- 2	
			ndicular, diago	nal to flow)(%):		Para-29%
	al- 14%, Perp.					
-	/Structure Fu			and amphibian		
Notes: most do not have pools, none providing bank protection, none marked as						
	causing bar	nk erosion				
	<u>haracterisiti</u>					
Channe		176 ft			Pool Depths:	
Bed Material Composition: Cobble/Gravel Riffle Depths:						
Rosgen (BEHI) Bank Stability: See Note 1 Flow Velocity: 1.5 fps			1.5 fps			
Notes:						
Propos	ed Design Co	oncepts _				
Type(s)	of LWD:				Number of LW	/ <u>D:</u>
Propose	ed Habitat/Str	ucture Functi <u>o</u>	n (s):			
See not	es on target a	area survey fiel	d maps.			
Other I	tems/Notes:	<u>.</u>				
1. Gene	eralized erosio	on mapping pro	vied on annota	ited field maps, v	with	
Erosion	Rated as follo	ws: A: BEHI Lo	w to Moderate	B: BEHI Modera	te to High,	
C: BEHI	High to Very I	High				
2. Gene	ral observatio	ns: highly sinu	ous, lower widt	h/depth		

Date: 10/7/2015	Enbridge Representative(s): BP, BD, IJ			
Target Area: 1	Agency Representative(s): MD, JW SJ, JR			
Mile Post Range: 5.75-6.75				
	_			
Existing Large Woody Debris Observatio	<u>ns</u>			
General Number of LWD Observed:	63			
LWD Type (tree, log, stump complex pile)(%): CP-49%, Log-30%, Tree- 19%, Stump 2%			
Position Orientation (parallel, perpendicular	r, diagonal to flow)(%): Para-38%			
Diagnoal- 23%, Perp38%				
Habitat/Structure Function: Most pro	ovides fish and amphibian/reptile habitat,			
Notes: most do not have pools, some providing bank protection, five marked as				
causing bank erosion				
River Characterisitics				
Channel Width: 180 ft	Pool Depths: 2'			
Bed Material Composition: Cobble/0	· -			
Rosgen (BEHI) Bank Stability: See Note 1	Flow Velocity: 1.5 fps			
Notes:				
Proposed Design Concepts				
Type(s) of LWD:	Number of LWD:			
Proposed Habitat/Structure Function (s):				
Troposed Habitaty Structure Turietion (3).				
See notes on target area survey field maps				
See notes on target area survey neid maps	•			
Other Items/Notes:				
	annotated field mans, with			
1. Generalized erosion mapping provied on				
Erosion Rated as follows: A: BEHI Low to Mo	derate B. Beni Moderate to night,			
C: BEHI High to Very High				
2. General observations: pools relatively sha	illow, reach overly wide			

Date:	10/8/20	15		Enbridge Representative(s): BP, BD, IJ			
Target A	rea:	8		Agency Rep	presentative(s):	MD, BG SJ, JR	
Mile Pos	st Range:	21.25-22.75					
Existing	Large Woo	<u>dy Debris Obs</u>	ervations ervations				
		WD Observed:		200			
	-	stump complex			og-23%, Tree- 2		
			ndicular, diagon	al to flow)(%):		Para-25%	
	ıl- 33%, Perp						
Habitat/	Structure Fu		III provides fish			i,	
Notes: most do not have pools, few providing bank protection, two marked as							
	causing bar	nk erosion					
	naracterisiti	<u>cs</u>					
Channel		172 ft			Pool Depths:		
Bed Mat	terial Compo	sition: <u>C</u>	Cobble/Gravel		Riffle Depths:	1.5'-2'	
Rosgen	(BEHI) Bank S	Stability: See N <u>o</u>	te 1		Flow Velocity:	1.9 fps	
Notes:							
Propose	ed Design Co	oncepts					
Type(s)	of LWD:				Number of LW	<u>'D:</u>	
Propose	d Habitat/Str	ructure Functi <u>o</u> i	n (s):				
		_					
See note	es on target a	area survey fiel	d maps.				
Other It	tems/Notes	<u>.</u>					
1. Gene	ralized erosio	on mapping pro	vied on annotat	ed field maps, v	vith		
Erosion	Rated as follo	ows: A: BEHI Lov	w to Moderate E	3: BEHI Moderat	te to High,		
C: BEHI I	High to Very	High					
		_	n/depth, deeper	pools, runs and	l some riffles		

Date: 10/8/2015	Enbridge Rep	Enbridge Representative(s): BP, BD, IJ			
Target Area: 7	Agency Rep	presentative(s):	MD, BG SJ, JR		
Mile Post Range: 19.25-20.25					
Existing Large Woody Debris Obse	ervations				
General Number of LWD Observed:	117				
LWD Type (tree, log, stump complex	pile)(%): CP-56%, L	og-32%, Tree- 1	.1%, Stump 1%		
Position Orientation (parallel, perper	ndicular, diagonal to flow)(%):		Para-48%		
Diagnoal- 21%, Perp32%					
	lmost all provides fish and am	phibian/reptile	habitat,		
Notes: most do not have pools, some providing bank protection, none marked as					
causing bank erosion					
River Characterisitics					
Channel Width: 248 ft		Pool Depths:	2.6' (Plane bed)		
	oars sands/Gravels	Riffle Depths:			
Rosgen (BEHI) Bank Stability: See No		Flow Velocity:			
Notes:		riow velocity.	0.0 103		
Notes.					
Proposed Design Consents					
Proposed Design Concepts Type(s) of LWD:		Number of IM	/D·		
Type(s) of LWD:		Number of LW	υ:		
Proposed Habitat/Structure Function	(\$):				
6					
See notes on target area survey field	ı maps.				
Other Items/Notes:					
1. Generalized erosion mapping pro-					
Erosion Rated as follows: A: BEHI Lov	v to Moderate B: BEHI Moderat	te to High,			
C: BEHI High to Very High					

Date: 10/8/2015		Enbridge Representative(s): BP, BD, IJ			
Target Area:	9	Agency Repre	esentative(s): MD, BG SJ, JR		
Mile Post Range:	24.375				
Existing Large Woody	Debris Observations				
General Number of LWI	Observed:	53			
LWD Type (tree, log, stu	mp complex pile)(%):	CP-60%, Log	-21%, Tree- 19%, Stump 0%		
Position Orientation (parallel, perpendicular, diagonal to flow)(%): Para-34%					
Diagnoal- 11%, Perp55	5%				
Habitat/Structure Funct	ion: All provide	s fish and amphibian/re	ptile habitat,		
Notes: most do not h	ave pools, none provi	ding bank protection, n	one marked as		
causing bank	erosion				
River Characterisitics					
Channel Width:	165 ft	P	ool Depths: 4'-6'		
Bed Material Composition: Cobble/Gravel Riffle Depths: 1.25'-2'			iffle Depths: 1.25'-2'		
			ow Velocity: 1.7 fps		
Notes:	,		, 		
Proposed Design Cond	cepts				
Type(s) of LWD:	<u></u>	N	umber of LWD:		
Proposed Habitat/Struct	ture Function (s):				
,	<u> </u>		-		
See notes on target are	a survey field maps.				
	a control more mapor				
Other Items/Notes:					
Generalized erosion	manning provied on ar	notated field mans with	า		
Erosion Rated as follows					
C: BEHI High to Very Hig		Liate D. Dein Woderate	<u></u>		
2. General observations		stable cobbly			
2. Serierai observations	. accpci pools illostly :	stable, cobbly			

Date: 10/8/2015		Enbridge Re	presentative(s)	BP, BD, IJ	
Target Area:	11	- Agency Re	presentative(s)	MD, BG SJ, JR	
Mile Post Range:	28.00-29.25	•			
		_			
Existing Large Woody	Debris Observations	<u>i</u>			
-					
General Number of LW	D Observed:	107			
LWD Type (tree, log, stu	ump complex pile)(%):	CP-38%, L	og-36%, Tree- 2	22%, Stump 4%	
Position Orientation (pa	arallel, perpendicular, o	diagonal to flow)(%):		Para-50%	
Diagnoal- 9%, Perp42	%				
Habitat/Structure Function: All provides fish and amphibian/reptile habitat,					
Notes: most do not have pools, none providing bank protection, one marked as					
causing bank erosion					
River Characterisitics					
Channel Width:	190 ft		Pool Depths:	4.5'-7'	
Bed Material Compositi	ion: Coars Sand	ds/Gravel	Riffle Depths:		
Rosgen (BEHI) Bank Sta	bility: See Note 1		Flow Velocity:	1.7 fps	
Notes:	•		•		
Proposed Design Con	cepts				
Type(s) of LWD:	<u></u>		Number of LWD:		
Proposed Habitat/Struc	ture Function (s):				
, , , , , , , , , , , , , , , , , , , ,	<u> </u>				
See notes on target are	a survey field maps.				
out notes on tanger and	, a can co, nota mapo				
Other Items/Notes:					
Generalized erosion	manning provied on a	nnotated field mans v	with		
C: BEHI High to Very High	Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,				
C. BEITH THEIL TO VELY THE	511				
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Date: 10/8/20	15	_ Enbridge Rep	oresentative(s):	BP, BD, IJ	
Target Area:	14	- Agency Rep	oresentative(s):	MD, BG SJ, JR	
Mile Post Range:	32.25-32.75	<u>-</u>			
Existing Large Woo	dy Debris Observations	<u>S</u>			
General Number of I	WD Observed:	57			
	stump complex pile)(%):		ng-30%. Tree- 2	25%, Stump 2%	
	(parallel, perpendicular,		og 90/0, 1100 I	Para-48%	
Diagnoal- 17%, Perp	•	<u>-</u> 101 1 1 7,11,			
Habitat/Structure Fu		es fish and amphibian,	/reptile habitat	t,	
Notes: most do no	ot have pools, none prov	iding bank protection,	none marked	as	
causing ba	nk erosion				
River Characterisiti	<u>cs</u>				
Channel Width:	188 ft		Pool Depths:		
Bed Material Compo	sition: Cobble/Gr	ravel	Riffle Depths:	No discernable riffl	
Rosgen (BEHI) Bank S	Stability: See N <u>ote 1</u>		Flow Velocity:	1.5 fps	
Notes:					
Proposed Design C	<u>oncepts</u>				
Type(s) of LWD:			Number of LW <u>D</u> :		
Proposed Habitat/St	ructure Functi <u>on (s):</u>				
C	awaa aumuuu fiald waawa				
See notes on target	area survey field maps.				
Other Items/Notes	:				
	- on mapping provied on a	nnotated field maps, v	vith		
	ows: A: BEHI Low to Mod				
C: BEHI High to Very			,		
	ons: pools relatively shall	ow, reach overly wide			
	•	•			

Date: 10/7/2015		Enbridge	e Representative(s):	: BP, BD, IJ	
Target Area:	6	Agenc	y Representative(s):	MD, JW, SJ, JR	
Mile Post Range:	14.75				
Existing Large Woody	Debris Observations				
General Number of LW	D Observed:	9			
LWD Type (tree, log, stu	ump complex pile)(%):	CP-22%, I	og-11%, Tree- 67%	, Stump 0%	
Position Orientation (pa	arallel, perpendicular, dia	gonal to flow)(%):		Para-20%	
Diagnoal- 20%, Perp6	0%				
Habitat/Structure Func	tion: All provides	fish and amphibiar	/reptile habitat,		
Notes: most do not h	nave pools, few providing	g bank protection,	none marked as		
causing bank	erosion				
River Characterisitics					
Channel Width:	229 ft		Pool Depths:	4'	
Bed Material Compositi	on: Coarse sands	/gravels	Riffle Depths:	No discernible riffle	
Rosgen (BEHI) Bank Sta	bility: See Note 1		Flow Velocity:	NA/	
Notes:					
Proposed Design Con-	<u>cepts</u>				
Type(s) of LWD:		_	Number of LWD:		
Proposed Habitat/Struc	ture Function (s):				
See notes on target are	na survey field mans				
See notes on target are	a survey held maps.				
Other Items/Notes:					
	mapping provied on anno	otated field maps.	with		
	s: A: BEHI Low to Modera	•			
C: BEHI High to Very Hig			<i>U ,</i>		
	,				

Date:	10/7/201	15		Enbridge Re	presentative(s):	BP, BD, IJ
Target A	rea:	3		Agency Re	presentative(s):	MD, JW, SJ, JR
Mile Pos	st Range:	10.50-11.00)			
Existing	Large Wood	<u>dy Debris Obs</u>	<u>ervations</u>			
General	Number of L	WD Observed:		48		
	-	stump complex			.og-23%, Tree-1	
Position	Orientation ((parallel, perpe	<u>ndicular, d</u> iagona	I to flow)(%):		Para-38%
	l- 23%, Perp.					
Habitat/	'Structure Fur	nction:	All provides fish a	ınd amphibian	/reptile habitat	t,
Notes:	most do no	t have pools, r	nost providing ba	ink protection	, one marked as	S
	causing bar	nk erosion				
River Cl	naracterisitio	<u>CS</u>				
Channel	Width:	161 ft			Pool Depths:	4.5'
Bed Mat	terial Compos	sition: <u>(</u>	Coarse Sand/Grav	<u>rel</u>	Riffle Depths:	2'
Rosgen	(BEHI) Bank S	tability: See No	ote 1		Flow Velocity:	0.8 fps
Notes:						
Propose	ed Design Co	oncepts .				
Type(s)	of LWD:				Number of LW	/D:
Propose	d Habitat/Str	ucture Functio	n (s):			
		_				
See note	es on target a	rea survey fie	ld maps.			
Other It	tems/Notes:					
1. Gene	ralized erosio	on mapping pro	vied on annotate	ed field maps, v	with	
			w to Moderate B			
	High to Very I					
	2. General observations: more pools, deeper runs, sandier substrate,					
	1 / 1 / 1 / 1 / 1					

Date: 10/7/20 3	15	Enbridge Rep	presentative(s):	BP, BD, IJ
Target Area:	2	Agency Rep	presentative(s):	MD, JW, SJ, JR
Mile Post Range:	7.375-8.25			
Existing Large Wood	dy Debris Observations			
General Number of L	-	73		
	stump complex pile)(%):	•	og-41%, Tree-1	9%, Stump 3%
Position Orientation	(parallel, perpendicular, d	liagonal to flow)(%):		Para-47%
Diagnoal- 27%, Perp.	-26%			
Habitat/Structure Fur	nction: Almost all J	provides fish and amı	phibian/reptile	habitat,
Notes: most do no	t have pools, most provid	ding bank protection,	none marked	as
causing bar	ık erosion			
River Characterisition	<u>cs</u>			
Channel Width:	158 ft		Pool Depths:	4.5'
Bed Material Compos	sition: Cobble/Gra	avel	Riffle Depths:	2'
Rosgen (BEHI) Bank S	tability: See Note 1		Flow Velocity:	0.8 fps
Notes:	•			
Proposed Design Co	oncepts .			
Type(s) of LWD:			Number of LW	/D:
Proposed Habitat/Str	ucture Function (s):			
See notes on target a	area survey field maps.			
Other Items/Notes:	-			
1. Generalized erosic	on mapping provied on an	notated field maps, v	vith	
Erosion Rated as follo	ows: A: BEHI Low to Mode	erate B: BEHI Moderat	e to High,	
C: BEHI High to Very I	High			
2. General observation	ons: pools relatively shallo	w, reach overly wide		

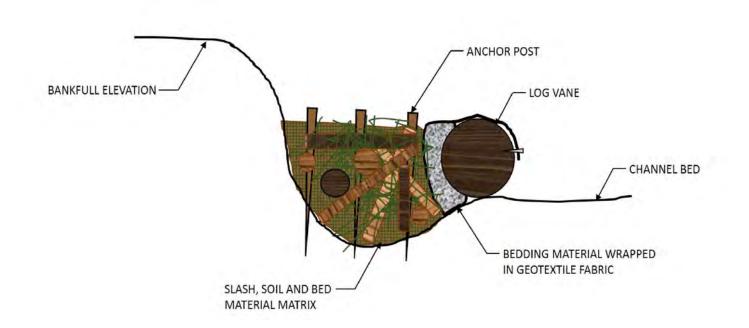
Date: 10/7/2015		_ Enbridge Repre	sentative(s): BP, BD, IJ
Target Area:	4	Agency Repre	sentative(s): MD, JW, SJ, JR
Mile Post Range:	11.75	_	·
		_	
Existing Large Woody	Debris Observations	<u>5</u>	
General Number of LWI	Observed:	15	
LWD Type (tree, log, stu	mp complex pile)(%):	CP-33% Log-2	20%, Tree-33%, Stump 13%
Position Orientation (pa	rallel, perpendicular,	diagonal to flow)(%):	Para-11%
Diagnoal- 10%, Perp79)%		
Habitat/Structure Funct	ion: All provide	es fish and amphibian/re	ptile habitat,
Notes: most do not h	ave pools, none provi	iding bank protection, no	ne marked as
causing bank o	erosion		
River Characterisitics			
Channel Width:	140 ft	Po	ool Depths: 4.5'
Bed Material Composition	on: Cobble/Gr	avel Ri	ffle Depths: 1.8'
Rosgen (BEHI) Bank Stak	oility: See Note 1		ow Velocity: 1.9 fps
Notes:			
Proposed Design Cond	cepts		
Type(s) of LWD:		N	umber of LWD:
Proposed Habitat/Struct	ture Function (s):		
			
See notes on target are	a survey field maps.		
J	, .		
Other Items/Notes:			
	mapping provied on a	nnotated field maps, with	1
		erate B: BEHI Moderate t	
C: BEHI High to Very Hig			<u> </u>
		width/depth for a lot of r	each
The state of the s			

Date: 10/7/2015		Enbridge	Representative(s)	: BP, BD, IJ
Target Area:	5	Agency	Representative(s)	: MD, JW, SJ, JR
Mile Post Range:	12.5			
Existing Large Woody	Debris Observations			
General Number of LWD	Observed:	26		
LWD Type (tree, log, stu	mp complex pile)(%):	CP-46% L	og-19%, Tree-35%	6, Stump 0%
Position Orientation (pa	rallel, perpendicular, d	liagonal to flow)(%):		Para-33%
Diagnoal- 13%, Perp54	1%			
Habitat/Structure Funct	ion: All provide	s fish and amphibiar	n/reptile habitat,	
Notes: most do not h	ave pools, few providi	ing bank protection,	none marked as	
causing bank e	erosion			
River Characterisitics				
Channel Width:	118 ft		Pool Depths:	2.6'
Bed Material Composition	on: Cobble/Gra	avel	Riffle Depths:	2.6'
Rosgen (BEHI) Bank Stak	oility: See N <u>ote 1</u>		Flow Velocity:	2.5 fps
Notes:				
Proposed Design Conc	<u>epts</u>			
Type(s) of LWD:			Number of LWD):
Proposed Habitat/Struct	ture Function (s):			
See notes on target are	a survey field maps.			
Other Items/Notes:				
1. Generalized erosion i	mapping provied on ar	notated field maps,	with	
Erosion Rated as follows	s: A: BEHI Low to Mode	erate B: BEHI Modera	te to High,	
C: BEHI High to Very Hig	h			
2. General observations: dynamically eroding along reach				

Date: 10/8/2	015	Enbridge	Representative(s)	: BP, BD, IJ	
Target Area:	13	Agency	Representative(s)	: MD, BG, SJ, JR	
Mile Post Range:	31.75-32.00				
Existing Large Wo	ody Debris Observations				
General Number of	LWD Observed:	37			
LWD Type (tree, log	g, stump complex pile)(%):	CP-51% Lo	og-32%, Tree-14%	5, Stump 3%	
Position Orientation	n (parallel, perpendicular, d	iagonal to flow)(%):		Para-49%	
Diagnoal- 27%, Per	p24%				
Habitat/Structure F	unction: All provide	s fish and amphibian	/reptile habitat,		
Notes: most do r	not have pools, none provid	ling bank protection	, none marked as		
	ank erosion				
River Characterisi	tics				
Channel Width:	190 ft		Pool Depths:	3'-4'	
Bed Material Comp	osition: Cobble/Gra	vel	Riffle Depths:	1'-2'	
•	Stability: See Note 1		Flow Velocity:	1.9 fps	
Notes:	•		,	•	
Proposed Design	Concepts				
Type(s) of LWD:			Number of LWD	:	
	Structure Function (s):				
•					
See notes on targe	t area survey field maps.				
· ·	, .				
Other Items/Note	es:				
Generalized erosion mapping provied on annotated field maps, with					
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,					
C: BEHI High to Very High					
	2. General observations: pools relatively shallow, reach overly wide				
	· · · · · · · · · · · · · · · · · · ·				
-					

Date: 10/9/201 5	5	Enbridge F	Representative(s)	BP, BD, IJ
Target Area:	18	Agency F	Representative(s)	MD, BG, SJ, JR
Mile Post Range:	36.50-37.25			
Existing Large Woody	/ Debris Observations			
General Number of LW	'D Observed:	80		
LWD Type (tree, log, st	ump complex pile)(%): _	CP-40% Lo	g-20%, Tree-36%	, Stump 4%
Position Orientation (p	arallel, perpendicular, d	iagonal to flow)(%):		Para-42%
Diagnoal- 8%, Perp51	1%			
Habitat/Structure Fund	tion: All provide	s fish and amphibian,	/reptile habitat,	
Notes: most do not	have pools, none provid	ding bank protection,	none marked as	
causing bank	erosion			
River Characterisitics				
Channel Width:	840 ft (reservoir)		Pool Depths:	N/A
Bed Material Composit	ion: Sands		Riffle Depths:	N/A
Rosgen (BEHI) Bank Sta	ability: See Note 1		Flow Velocity:	N/A
Notes:	•			
Proposed Design Cor	<u>icepts</u>			
Type(s) of LWD:			Number of LWD	<u> </u>
Proposed Habitat/Stru	cture Function (s):			
See notes on target ar	ea survey field maps.			
Other Items/Notes:				
1. Generalized erosion	mapping provied on an	notated field maps, v	vith	
Erosion Rated as follow	vs: A: BEHI Low to Mode	rate B: BEHI Moderat	e to High,	
C: BEHI High to Very Hi	gh			

Attachment B Proposed Large Woody Debris Details

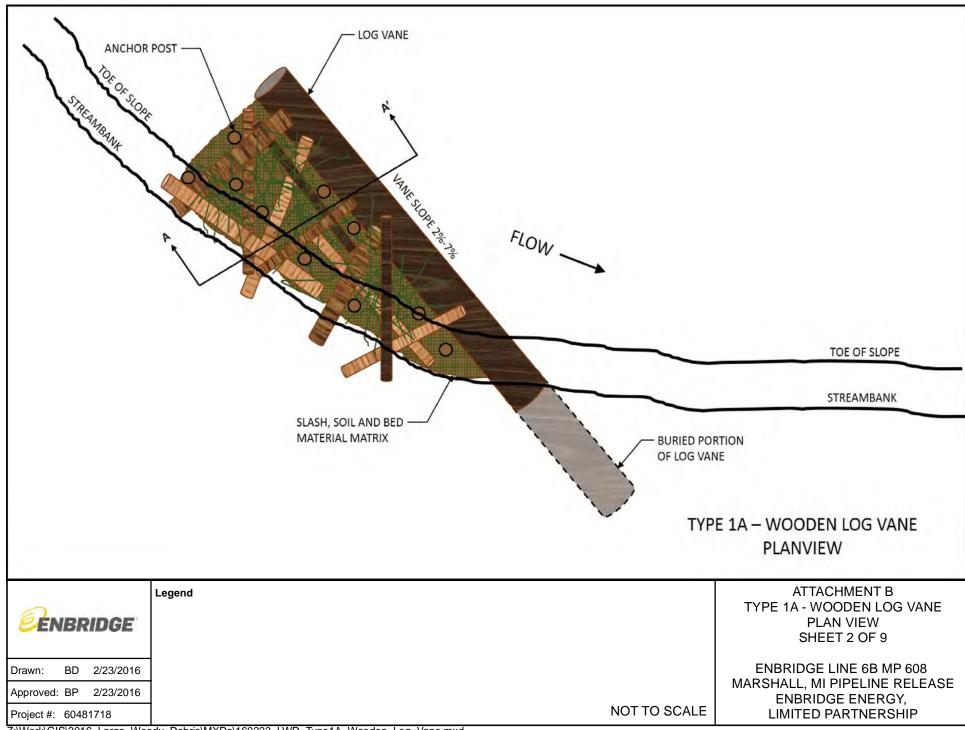


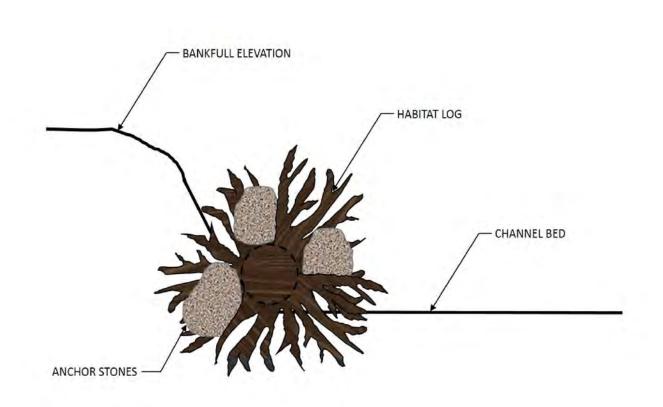
TYPE 1A – WOODEN LOG VANE SECTION VIEW A-A'

Legend

ATTACHMENT B
TYPE 1A - WOODEN LOG VANE
SECTION VIEW
SHEET 1 OF 9

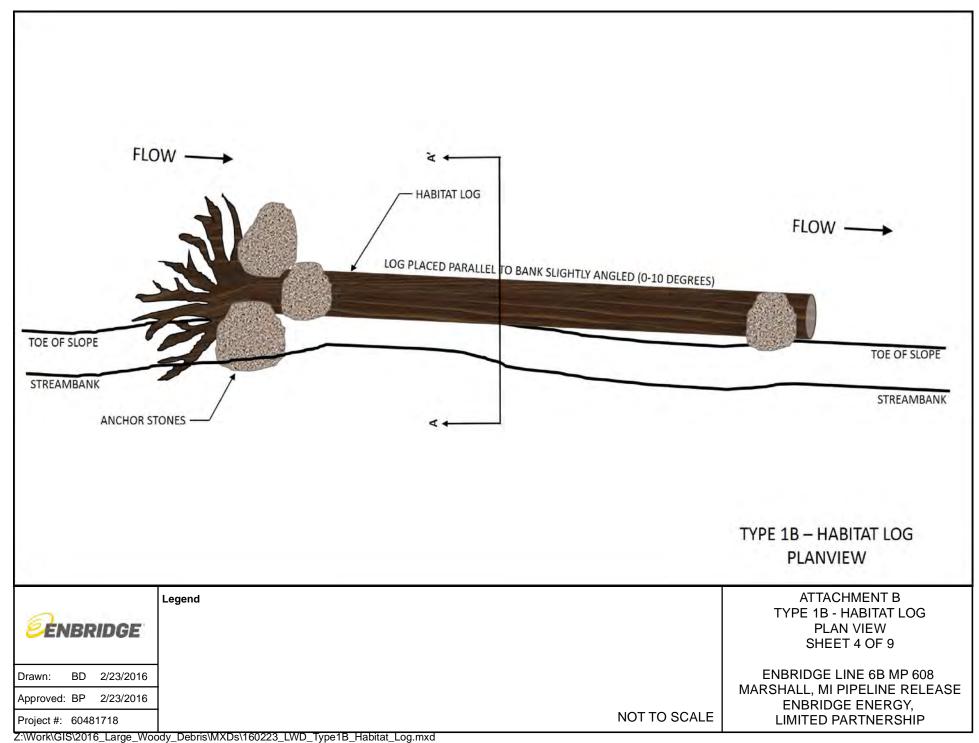
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

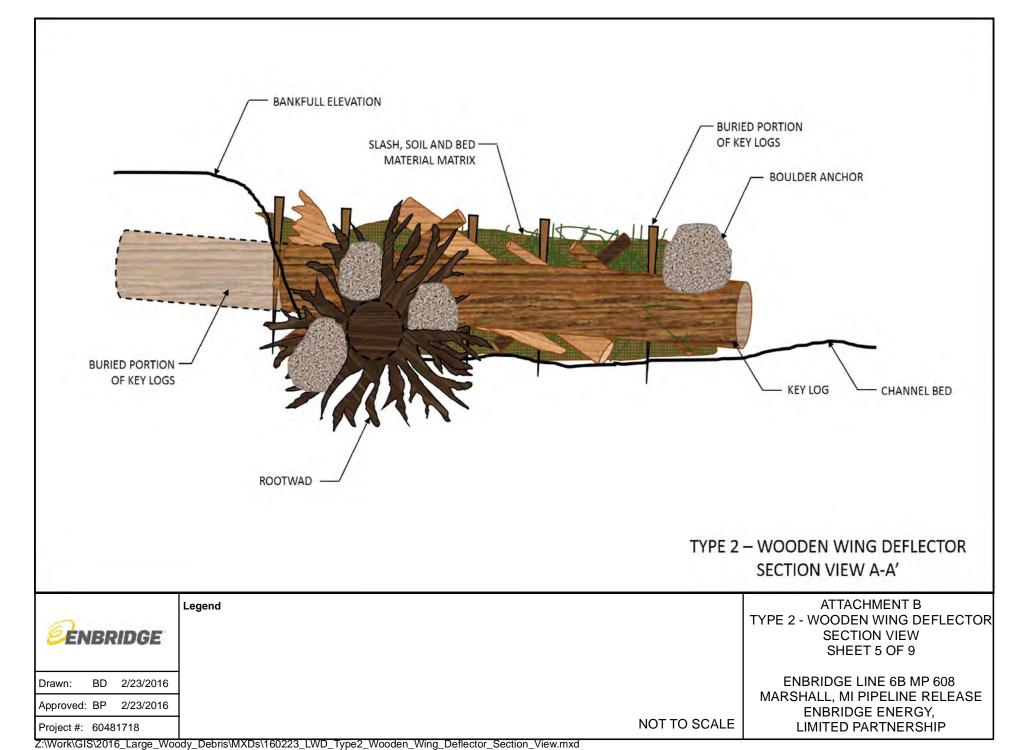


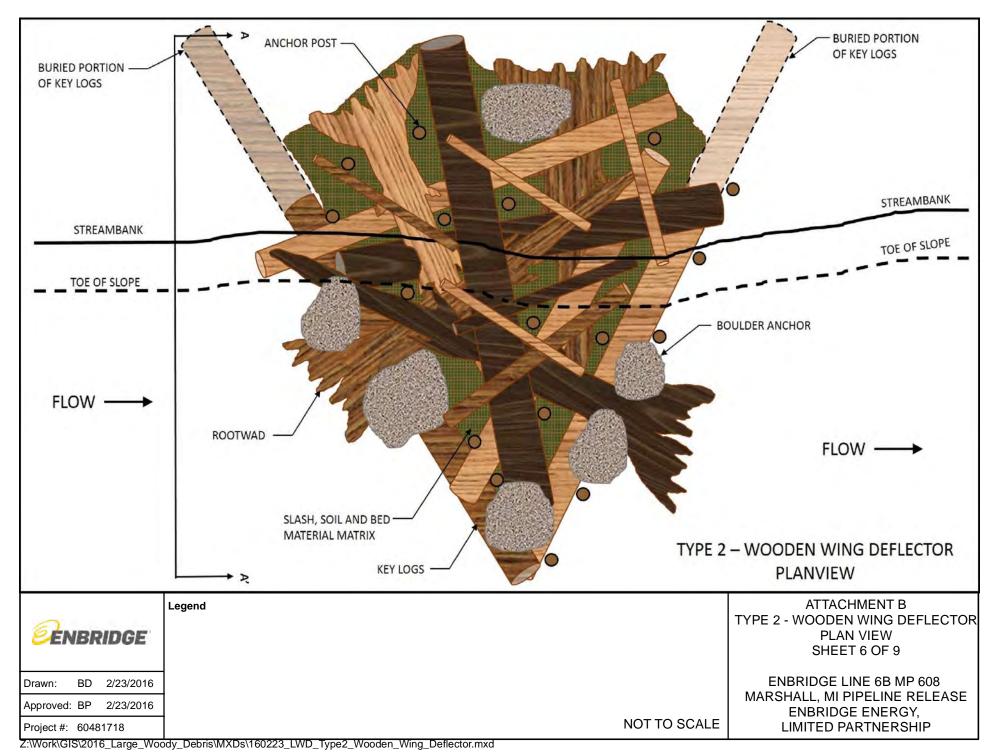


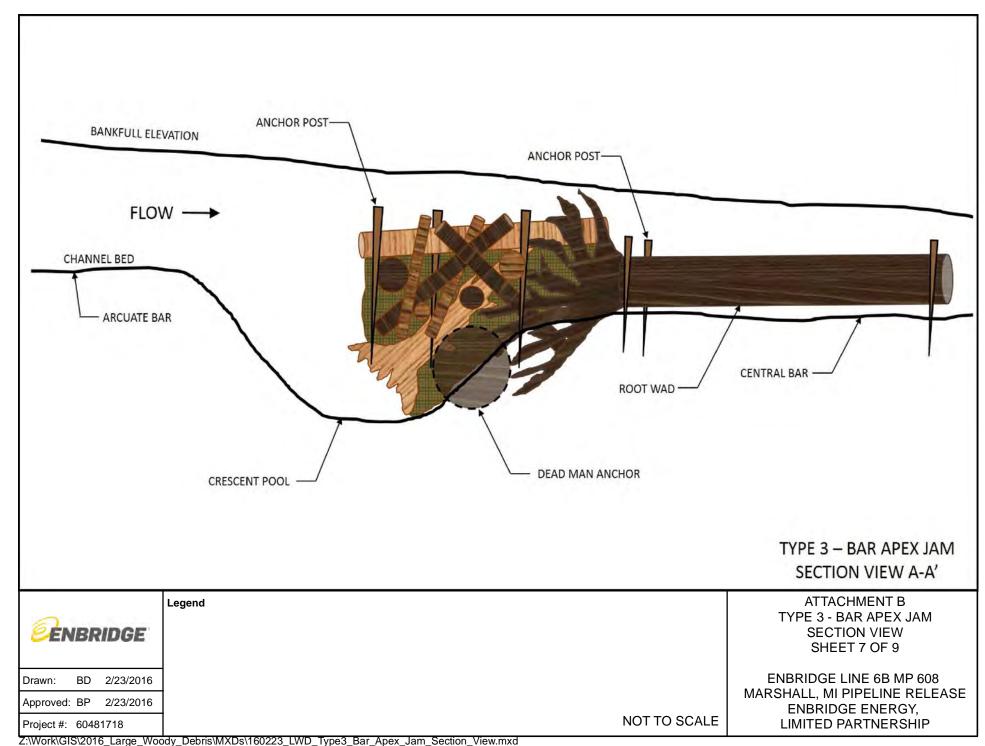
TYPE 1B – HABITAT LOG SECTION VIEW A-A'

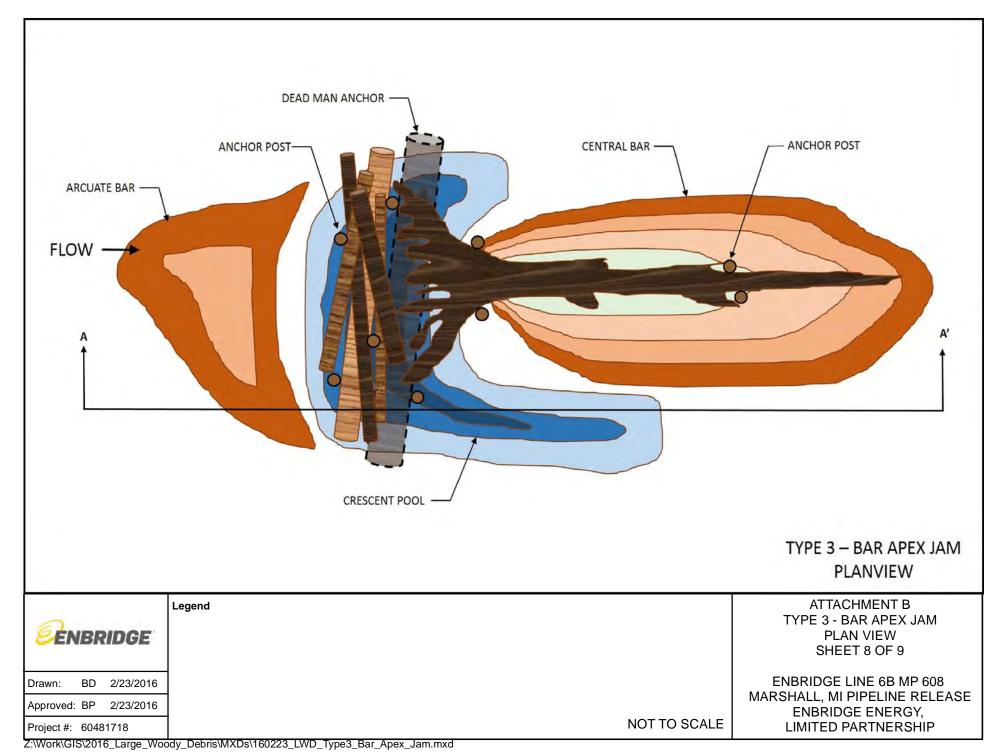
ENBRIDGE	Legend	ATTACHMENT B TYPE 1B - HABITAT LOG SECTION VIEW SHEET 3 OF 9
Drawn: BD 2/23/2016 Approved: BP 2/23/2016		ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY,
Project #: 60481718	NOT TO SCALE	LIMITED PARTNERSHIP

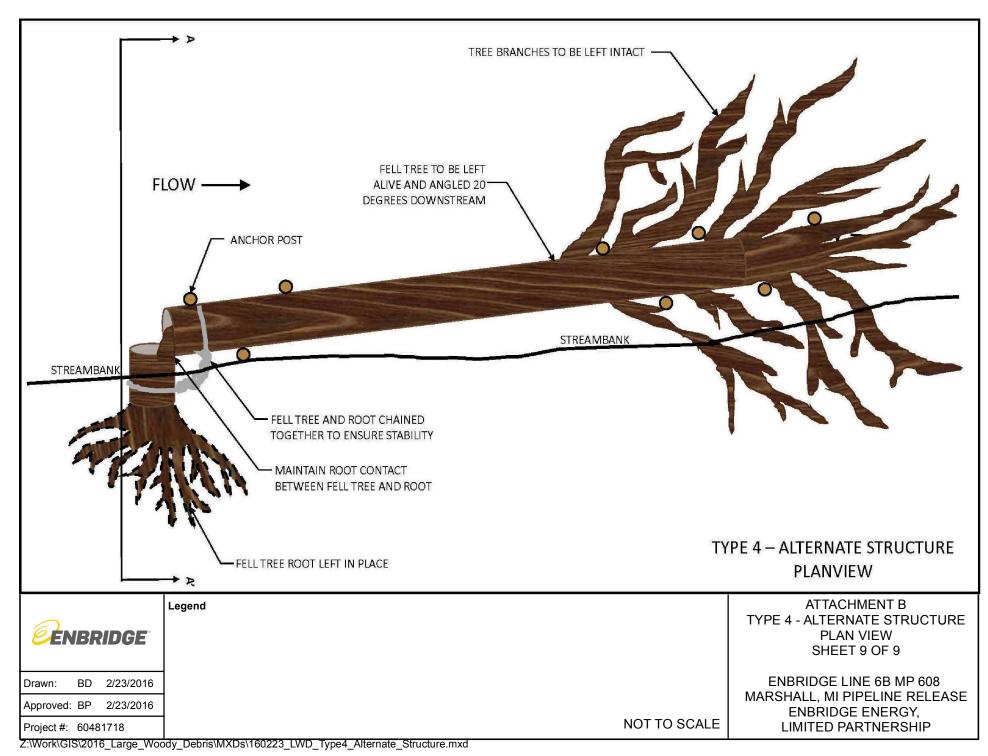












Attachment C Large Woody Debris Exhibits

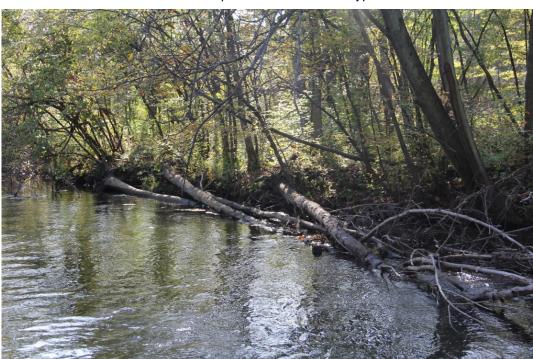


Exhibit 1. Natural example of LWD similar to Type 1A Structure





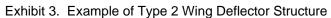




Exhibit 4. Example of Type 2 Wing Deflector Structure



Exhibit 5. Example of Type 2 Wing Deflector Structure

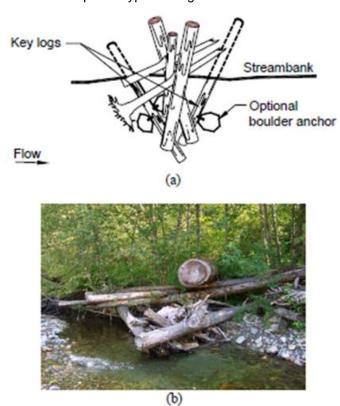
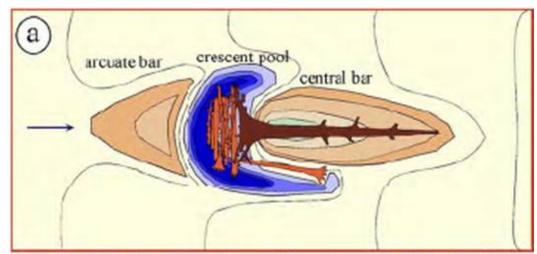


Exhibit 6. Natural Example of Type 2 Wing Deflector Structure



Exhibit 7. Schematic of LWD similar to Type 3 Structure (from WDF, 2012)



Large Wood and Log Jams Figure 6. Deposition in the hydraulic "shadow of an instream tree, burying the bole of the tree. (courtesy Tim Abbe)

Exhibit 8. Natural Example of Type 3 LWD Structure



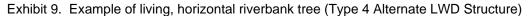




Exhibit 10. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)







Exhibit 12. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)





Exhibit 13. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)

